

- 8 -

CLAIMS

1. An internal combustion engine comprising:
 - a combustion chamber;
 - 5 first and second inlet valves controlling flow of air into the combustion chamber;
 - first and second exhaust valves controlling flow of combusted gases out of the combustion chamber; and
 - first and second turbo-chargers; wherein:
 - 10 the first turbo-charger is connected to the first inlet valve and the second turbo-charger is connected to the second inlet valve;
 - charge air supplied to the combustion chamber via the first inlet valve is pressurised only by first turbo-
 - 15 charger;
 - charge air supplied to the combustion chamber via the second inlet valve is pressurised only by the second turbo-charger;
 - the first turbo-charger is connected to the first
 - 20 exhaust valve and receives only combusted gases expelled via the first exhaust valve;
 - the second turbo-charger is connected to the second exhaust valve and all combusted gases expelled via the second exhaust valve flow to the second turbo-charger
 - 25 without passing through the first turbo-charger;
 - valve operating means controls operation of the first inlet valve and first exhaust valve independently from the operation of the second inlet valve and second exhaust valve thereby providing variation in the ratio of the mass of
 - 30 charge air supplied to the combustion chamber via the first inlet valve to the mass of charge air supplied to the combustion chamber via the second inlet valve; and

-9-

the valve operating means is controlled by an electrical controller to vary operation of the inlet and exhaust valves and thereby the turbo-chargers having regard to changes in engine operating conditions, the controller being able to select between different modes of operations, including:

a first operating mode in which the valve operating means deactivates the second inlet valve and the second exhaust valve whereby all charge air supplied to the combustion chamber is pressurised by the first turbo-charger and delivered via the first inlet valve; and

a second operating mode in which the valve operating means operates simultaneously the first and second inlet valves and the first and second exhaust valves whereby charge air supplied to the combustion chamber is pressurised by both of the first and second turbo-chargers and delivered via both the first and second inlet valves;

characterised in that:

the controller can also select a third operating mode in which the valve operating means deactivates the first inlet valve and the first exhaust valve whereby all charge air supplied to the combustion chamber is pressurised by the second turbo-charger and delivered via the second inlet valve.

2. An internal combustion engine as claimed in claim 1 wherein combusted gases leaving the first turbo-charger are relayed to the second turbo-charger and drive the second turbo-charger jointly with the combusted gases supplied via the second exhaust valve.

-10-

3. An internal combustion engine as claimed in claim 1
wherein combusted gases leaving each of the first and second
5 turbo-chargers are relayed to exhaust without passing
through the other turbo-charger.

4. An internal combustion engine as claimed in any one of
the preceding claims wherein the first inlet valve is
10 associated with a first inlet port which imparts to charge
air flowing therethrough a flow characteristic different to
a flow characteristic imparted to charge air flowing through
a second inlet port associated with the second inlet valve.

15 5. An internal combustion engine as claimed in claim 4
wherein the first inlet port imparts to the charge air
flowing therethrough a degree of swirl greater than the
degree of swirl imparted to charge air flowing through the
second inlet port.

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6. An internal combustion engine as claimed in any one of
the preceding claims comprising a first intercooler for
cooling air pressurised by the first turbo-charger before
the air flows into the combustion chamber via the first
25 inlet valve and a second intercooler for cooling air
pressurised by the second turbo-charger before the air flows
into the combustion chamber via the second inlet valve.

7. An internal combustion engine as claimed in any one of
30 the preceding claims wherein the first turbo-charger is a
low pressure turbo-charger and the second turbo-charger is a
high pressure turbo-charger.

-11-

8. An internal combustion engine as claimed in claim 10 wherein the electrical controller controls the valve operating means to increase flow of exhaust gas to the high pressure turbo-charger and thereby air flow through the high pressure turbo-charger to the second inlet valve during periods of acceleration of the engine.

9. An internal combustion engine as claimed in claim 7 or claim 8 wherein the electrical controller controls the valve operating means with increasing engine speed and/or load to increase flow of exhaust gas to the high pressure turbo-charger and thereby flow of charge air through the high pressure turbo-charger to the second inlet valve.

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10. An internal combustion engine as claimed in any one of the preceding claims wherein the valve operating means comprises an electro-hydraulic actuator individual to each inlet valve and each exhaust valve and controlled by the electrical controller.

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